method is to marshal the facts and suggest the conclusions to which they point. One of the most delightful characteristics of the book is the sympathetic interest which the author shows, on almost every page, in the labours of other workers. His sympathies are as all-embracing as the views which he has formed as to the origin of terrestrial features.

The French translations of the first two volumes have already been referred to. The extensive knowledge and great literary skill of M. E. de Margérie, under whose direction the translation has been carried out, are a sufficient guarantee of the excellence of the work. It has evidently been a labour of love with the translators, who have treated their author with that respect which should always be shown in such cases. In two respects the translations are better than the original work. The number of maps and illustrations has been greatly increased (128 as against 43 for the second volume), and the notes, which are voluminous and often very important, are given at the foot of the page to which they refer instead of at the end of each section. Moreover, the notes and references have been brought up to date, but all additions are indicated by the use of square brackets.

J. J. H. T.

THE CHEMISTRY OF DYEING.

A Dictionary of Dyes, Mordants and other Compounds used in Dyeing and Calico Printing. By Christopher Rawson, F.I.C., F.C.S., Walter M. Gardner, F.C.S., and W. F. Laycock, Ph.D., F.C.S. Pp. 372. (London: Charles Griffin and Co., Ltd., 1901.) Price 16*s.* net.

THE technology of dyestuffs and dyeing materials has acquired in recent years such a degree of complexity that a dictionary of the subject has become almost a necessity. This want is now supplied by the handy volume before us. Although essentially a dictionary and not to be regarded in the light of a text-book, it nevertheless contains many excellent articles on the chemistry and technology of textile fibres and colouring matters, and should be a most valuable work of reference for all engaged in the arts of dyeing, bleaching, calico printing, paper staining, &c. The book is issued as a companion volume to the well-known "Manual of Dyeing," by Knecht, Rawson and Loewenthal, to which in some respects it serves as a supplement. The methods for the commercial analysis of the various chemicals, mordants and dyeing materials are treated with considerable detail. With regard to colouring-matters a careful system of classification is employed, each group being given a special article, *e.g.*, acid colours, basic colours, direct cotton colours, mordant dyes, &c., and under each of these headings we find a fairly complete list of all the colouring-matters of the particular group at present in use. For further information with regard to individual dyestuffs, each name must be separately consulted. Excellent general articles are also to be found upon indigo, tannin matters, action of light upon dyes, and upon the analysis, valuation and detection of coal-tar colours.

On the other hand, besides a few superfluous articles having little or no bearing on the subject of dyeing (*e.g.*, the headings Acetaldehyde, Acetanilide, Antifebrine, &c.), there are some serious omissions. Thus no method is given for examining the quality of commercial betanaphthol, a matter of much greater importance to the dyer or printer than the isomerism of the sulphonic acids of dioxynaphthalene or of alphanaphthylamine, the reference to which might well be omitted. Again, there is no article upon paranitraniline, but only a cross reference under "Paranitraniline red" to "Azo colours on cotton," where no description is to be found of the properties or methods to be employed in examining for purity this most important product. The same remark applies to dianisidine, only "Dianisidine blue" being referred to under "Azo colours on cotton." The heading of the last-mentioned article should surely have been "Insoluble azo colours on cotton" or "Azo colours produced on the cotton fibre," since all the substantive benzidine colours when applied to cotton might equally be styled "Azo colours on cotton." We also fail to find any reference to sodium sulphide, bronze colours, discharges, persulphates or titanium mordants.

Under the individual colouring-matters there might have been given in some cases a rather fuller account of the special tinctorial properties and degree of fastness to reagents (soap, alkalis, acids, &c.) To provide for these additions considerable space might have been saved by the omission of the names of obsolete colouring-matters and of obsolete names of colouring-matters still used (for instance, aldehyde green, azuline, canelle, heliochrysine, and many others).

A few errors are noticeable in the text, as, for instance, in the article "Janus colours," which latter are stated to be sulphonated basic dyes, whereas in fact they contain no sulphonic group, but are azo-compounds, which owe their solubility and peculiar dyeing properties to the presence of strongly basic ammonium or azonium groups. Again, thioflavine T is given as a derivative of primuline, whereas it is the methylated ammonium compound of dehydrothiotoluidine. The list of manufacturers of colouring-matters given on p. 94 and also opposite to p. 1 is scarcely up-to-date, one of the firms mentioned having ceased to exist, whilst two others have been reconstituted under new names. In spite of the above defects, which can readily be rectified in subsequent editions, the work may be confidently recommended to all engaged in the textile and tinctorial industries as an invaluable lexicon of the subject.

ANIMAL LIFE OF THE CONGO FOREST.

The World of the Great Forest; How Animals, Birds, Reptiles, Insects Talk, Think, Work and Live. By Paul du Chaillu. Pp. xv + 323. Illustrated. (London: Murray, 1901.) Price 7*s.* 6*d.* net.

IN the outlandish and almost unpronouncable native names of animals which form the chapter-headings and recur with wearisome iteration in the text, this volume reminds us of Longfellow's "Hiawatha," although, in our opinion, without affording anything comparable to the pleasure which may be experienced in reading the latter. The author appears to have taken as his model that delightful book of Mr. Seton-Thompson's, "Wild Animals I Have Known"; but if so he has, we think, succeeded in producing only a very poor and feeble

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imitation. We have submitted Mr. Du Chaillu's volume to several friends of diverse ages and sexes in the hope of obtaining an opinion as to the class of readers for whose benefit it is specially intended, but in no instance have we succeeded in obtaining a definite answer on this point. One thing is perfectly certain, namely, that no scientific naturalist will gain any information worth having from a perusal of its pages. A lady suggested hat it was like a book for very young children, without being sufficiently amusing.

The author, who firmly believes that animals have a definite language by means of which they communicate their ideas, not only to their own fellows, but to the members of other species as well, had a grand subject before him in describing the life of the denizens of the great Congo forest. But, in our opinion, the conversation he has put into the mouths of the animals is the merest drivel. And when animals, such as leopards antelopes and elephants, have familiar English names, we quite fail to see the advantage of alluding to them, by their negro titles, apparently for the sake of translating them. When an animal like *Tragelaphus euryceros* has no good English name, it is right and proper that its native title—in this case "bongo"—should be employed; but the substitution of "kambi" for antelope is merely confusing. Neither is the work altogether free from absolute errors, while in several instances statements that have been controverted reappear as though they were undoubted facts. As an example of the former class we may refer to the statement on p. 42 that "large flocks of toucans (a bird with a huge bill)" are among the denizens of the Congo forest! As an instance of the second kind, it may be mentioned that (pp. 154–155) the author revives the old story of the gorilla advancing to the attack in the upright posture, beating his breast with his fists. We thought this story had been disposed of by Winwood Reade, who denies that du Chaillu ever saw a living gorilla in the wild state; and, so far as we are aware, no subsequent traveller, with better information at command, has ever said a word in its support.

Again, several of the incidents related appear absolutely incredible. For instance, on p. 95 we have a wonderful picture of a gorilla struggling to free himself from a porcupine on which he had incautiously trodden in his descent from a tree. Bearing in mind the well-known power in wild animals of detecting the presence of other creatures, such an event requires the most convincing testimony to render it credible, and yet it is related without special comment. In another chapter (p. 160) we are told how a python coiled around a tree-trunk "made a tremendous spring" and in an instant was coiled tightly round the body of an unfortunate antelope, which it squeezed to death. How a python could make the spring in question and at the same time disengage itself from the tree around which it was coiled we are not told. As a minor matter, a small inaccuracy in connection with this anecdote may be mentioned. In the accompanying illustration the antelope, which is evidently one of those species of which the females are unarmed, is represented with horns, and yet in the text it is alluded to as a female.

Although it is certainly incorrect to call a land-tortoise a turtle (p. 101), this confusion in terms may perhaps be excused on account of the author's nationality. A similar excuse cannot, however, possibly be made for the statement on p. 266 that "a pack of ugly-looking striped hyænas" advanced into the moonlight. In the first place, striped hyænas are quite unknown in West Africa; and, in the second, the author is refuted by his own draughtsman, who, in the plate on the opposite page, has figured an unmistakable group of *spotted* hyænas. Moreover, if we mistake not, the illustration in question is based, without acknowledgment, on a picture which has already appeared elsewhere.

Neither can we congratulate the author on his views with regard to the *raison d'être* of the coloration of certain animals. It has, for instance, been almost conclusively proved by Mr. Pocock in this Journal (vol. lxii. p. 584) that the striking type of coloration prevalent among the harnessed antelopes is strictly protective. And yet, when referring to the bongo (a member of the group), the author (p. 223) writes as follows:—

> "'My beauty is my curse, dear kambis and ncheris,' replied the bongo; 'my yellow colour and my white stripes are my bane, for my enemies, which are also yours, can spy me further and quicker than they do you.'"

Quite apart from the misapprehension of the object of the bongo's colouring, it may strike the reader of this marvellous book that animals thus endowed with the "knowledge of good and evil," as indicated by their conversation, might have been trusted to have devised some artificial mode of concealing themselves from their enemies! R. L.

OUR BOOK SHELF.

Roads; their Construction and Maintenance. By A. Greenwell, A.M.I.C.E., and J. V. Elsden, F.G.S. Pp. vii + 280. (London: Whittaker and Co., 1901.) Price 5*s*.

THIS is a very practical and useful treatise on roads and their maintenance and may be read with great advantage by any intelligent road surveyor. After the dissolution of the turnpike trusts and the handing over of the roads to the charge of the ordinary highway surveyors the main roads of this country became much neglected. The power acquired by County Councils over the main roads, and of District Councils over other highways, has to a certain extent revolutionised the system of road management and a marked improvement has taken place. The use of the cycle and the motor-car, however, demands a much higher standard of efficiency than was ever before required. There is no doubt that the motor-car, as a means of locomotion and transport, has come to stay and will in future fulfil in many cases functions for which now it is deemed necessary to provide light railways and suburban tramways. For these machines to be used with comfort a clear and even road surface, free from mud and loose stones at all times of the year, is indispensable. The best steam-rolled macadamised roads do not fulfil these conditions. In this respect what are termed tar macadam roads, which have been adopted in a great many suburban districts, not only afford a good surface for traction but, being impervious to wet and not acted upon by frost, are clean and more economical than macadamised roads; they are easily repaired and there is an entire absence of loose stones, equally dangerous for horses and deleterious to rubber tyres. The authors speak favourably of this class of road and describe the system as growing in favour, but the cost as given in

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